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QUALIFICATION TESTING CNU-263/E MAVERICK MISSILE
CONTAINER(U) AIR FORCE PACKAGING EVALUATION AGENCY
WRIGHT-PATTERSON AFB OH E J KOWALSKI SEP 83

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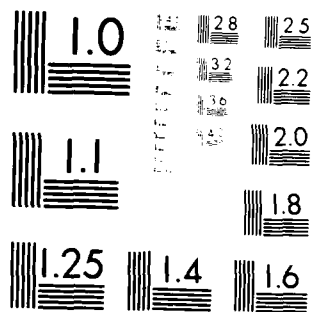
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PTPD Report No. 83-R-05
AFPEA Report No. 83-P7-132

AD-A134578

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QUALIFICATION TESTING

CNU-263/E MAVERICK MISSILE CONTAINER

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AIR FORCE PACKAGING EVALUATION AGENCY
Wright-Patterson AFB OH 45433

September 1983

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AFPEA PROJECT NO. 83-P7-132

TITLE: Qualification Testing CNU-263/E Maverick Missile Container

ABSTRACT

The Government of Switzerland is procuring AGM-65B Maverick Missiles from Hughes Aircraft thru the U.S. Government. The Maverick Missile containers CNU-263/E used for transporting/storage of the AGM-65B, will be fabricated by the Government of Switzerland.

The Air Force Packaging Evaluation Agency, WPAFB OH was requested by the Government of Switzerland to furnish services for qualification testing of a production prototype container.

Tests were conducted in accordance with Federal Test Method Standard No. 101, Military Standard-648, and Military Standard-810.

Results of all the tests are acceptable. The production type containers CNU-263/E will give adequate protection to the AGM-65B Maverick Missile during transportation/storage.

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INTRODUCTION

Background: The Government of Switzerland is procuring AGM-65B Maverick Missiles through the US Government, from Hughes Aircraft, Tucson, Arizona. Missile containers, CNU-263/E used for transporting and storage of the AGM-65E missile will be manufactured by the Government of Switzerland. The Air Force Packaging Evaluation Agency (AFPEA) was requested to furnish services for qualification testing of the prototype container.

Purpose: The purpose of this project was to determine if the prototype container CNU-263/E will protect its contents, the AGM-65B Maverick Missile, during transportation and storage.

Test Specimen: One CNU-263/E Maverick Missile container, serial number CH-001, fabricated from fiberglass materials (resin transfer molded) by Siegfried Peyer AG Switzerland CH-8832 Woolerau was furnished by the Government of Switzerland for testing.

Test Outline and Test Equipment

Tests were conducted in accordance with the AFPEA container test plan, project number 83-P7-132 Amend 1, dated 26 July 1983 (Table I). Test methods and procedures used were as outlined in Federal Test Method Standard No. 101, Military Standard-648, and Military Standard-810. Instrumentation and equipment used are annotated in each test procedure. The container shall limit transmission of shocks to the contents to a maximum of 40Gs resultant force.

Test Procedure and Results

Test No. 1: The container, as received, was visually inspected. The exterior and interior surfaces, markings, hardware, cushioning, strapping, and container seal were inspected for material and manufacturing imperfections.

Results: Results of the visual inspection are annotated in Table II. Slight damage was noted to the gel-coat on one of the forklift pockets and no provision was noted for a security seal. Figure 1 illustrates overwrap of paper fiberboard and wooden skid removed from the container. Figure 2 illustrates packaging of the strapping assemblies and the restraint assembly as received from the fabricator. Workmanship of the container is rated as excellent.

Test No. 2: An AGM-65/E inert Maverick Missile was mounted in the CNU-263/E container (figure 3). The container T-bolts were torqued to 45 inch pounds and the container was tested for pressure and vacuum leaks. Pressure and vacuum tests were performed at 1.00 psig. The failure criteria for each test was 0.025 psig for a 30-minute period (figure 4).

Results: At the end of the 30-minute pressure/vacuum test period, the results were as follows:

Pneumatic Pressure Test - 0.0162 psig.
Vacuum Test - 0.0220 psig

The results of the tests are acceptable.

Test No. 3: Figure 5 illustrates the container placed on a I.A.B. Corporation, Skaneateles, NY, Vibration Test Machine (LWVH), Type 5000-96B, serial number 56801. The container was placed on, but not fastened to the platform. Restraining blocks were attached to the platform to prevent the container from moving off the platform. A clearance of approximately 1/2 inch in all directions was used on the restraint blocks to allow free movement of the container during the 1/2 hour test period. With the container in position, the platform was vibrated until the container raised from the platform (1/16 inch feeler clearance between bottom of container and platform) for a maximum platform acceleration of 1G. The test was instrumented with a tri-axial accelerometer and was conducted at the ambient temperature.

Results: A maximum of 3Gs was obtained during the 1/2 hour test period of the repetitive shock test. The results of the test are acceptable.

Test No. 4: This test was conducted with the same procedure as test No. 3, except a superimposed load of two additional containers were placed on top of the original test container. Figure 6 illustrates the strapping of the three containers also, the tie-down of the containers to the platform.

Results: A maximum of 3Gs was obtained during the 1/2 hour test period of the superimposed load repetitive shock test. The results of the test are acceptable.

Test No. 5: Figure 7 illustrates the container as placed on the platen of a high capacity (50,000 pound) Compression Tester, Testing Machine, Inc., Amityville, NY model No. 17-24-2. A 2199 pound compression load was applied to the test container for a period of one hour. The test was observed for deflection, permanent deformation, and structural failure of the container cover and base assembly. The test was conducted at the ambient temperature.

Results: Inspection during and after the test did not reveal any damage to the container. Results of the test are acceptable.

Test No. 6: Figures 8, 9, and 10 illustrate the mechanical handling tests conducted with a 4,000 pound capacity hard rubber tired electric operated forklift truck. The tests included a one high, two high, and a three high container transport. The container(s) were lifted clear and transported on the forklift truck forks across a hard pavement for a distance of 100 feet. Parallel pairs of 1x3 inch lumber were laid flatwise on the pavement across the path of the forklift truck. The container(s) were carefully observed for any damage during the travel and stopping operations. Figures 11 and 12 illustrates the towing test. A strap was attached to the towing rings and the container was towed first from the end position and then from the side position across a hard pavement for a distance of 100 feet. The container was observed during travel for any damage that may have occurred.

Results: From inspection, no visual damage was noted to the container during the mechanical handling or the towing tests. Results of the tests are acceptable.

Test No. 7: Figure 13 illustrates the hoisting/tie-down provisions test. A 3565 pound load was placed on the test container. The test container was raised off the floor and held in that position for one hour. A leak test was performed at the end of the hoisting/tie-down test.

Results: Inspection during and after the hoisting/tie-down test did not reveal any damage to the container. At the end of the 30 minute pressure/vacuum test period, the results of the leak test were as follows:

Pneumatic Pressure Test - 0.000 psig.
Vacuum Test ----- 0.013 psig.

The results of the tests are acceptable.

Test No. 8: The conductive path test was performed by checking the DC OHM resistance from each terminating and breaking point from the missile skin to the external ground.

Results: The conductive path test measured 0.0068 DC OHM resistance. Results of the test are acceptable.

Test No. 9: Figure 14 illustrates the cover handle pull test. A calibrated scale was used to measure the 300 pound pull applied to the handles. The load was applied from several different angles to compensate for various methods of lifting the cover assembly.

Results: Visual inspection revealed no physical damage to the handles or cover of the test container. The results of the test are acceptable.

Test No. 10: An internal pressure of 1.50 psig was applied to the container for a test period of 15 minutes. The test container was tested for structural failure and permanent deformation of the lower and upper shells, and also for any structural failure around the handles and hoisting/tie-down rings.

Results: Visual inspection revealed no physical damage to the fiberglass material. The results of the test are acceptable.

Test No. 11: Figure 15 illustrates the test container in a test position in the rain/wind chamber. The test was conducted at simulated rainfall at a rate of 2 and 5 inches per hour and a horizontal wind velocity of 40 miles per hour. The test container was placed in the chamber at a 30 degree angle for a test period of 30 minutes. At the end of the 30 minute test period, the container was placed at a 330 degree angle for an additional test period of 30 minutes. At the end of the one hour test period, the container was removed from the chamber rotated 180 degrees, placed in the chamber and the test continued for an additional one hour period using the same test procedure. At the conclusion of the rain/wind exposure the test container was removed from the chamber, the moisture was removed from the exterior surface, and the container opened for inspection.

Results: Visual inspection revealed no water entry to the interior of the test container. The results of the test are acceptable.

Test No. 12: Figure 16 illustrates the cornerwise-drop (rotational) test. The height of drop on each of the four corners was at 20 inches. The drop height of 20 inches was based on the length dimension and not the weight of the test specimen. The test specimen was instrumented for the drop tests. One corner of the container was supported on a 12-inch block height. The opposite corner, same end, was supported on a 6-inch block height. The unsupported end

of the container was then raised so that the lower corner (6-inch support side) was at 20 inches from the floor. The electric quick release hook (L.A.B. Corporation, Skaneateles, NY, serial No. 5090208, 6,000 pound capacity) was energized and the test container allowed to fall on a concrete surface.

Results: Visual inspection of the test container revealed no damage. A maximum of 14.4Gs was obtained during the tests. The results of the tests are acceptable.

Test No. 13: Figures 17 and 18 illustrate the edgewise-drop (rotational) test. The height of drop on each of the four edges was at 20 inches. The drop height of 20 inches was based on the length dimension and not the weight of the test specimen. The test specimen was instrumented for the drop tests. The edge of the container was supported on a 6-inch block height. The unsupported edge was then raised so that the height was 20 inches from the floor. The electric quick release hook (L.A.B. Corporation, Skaneateles, NY, serial No. 5090208, 6,000 pound capacity) was energized and the test container allowed to fall on a concrete surface.

Results: Visual inspection of the test container revealed no damage. A maximum of 16.4Gs was obtained during the tests. The results of the tests are acceptable.

Test No. 14: Figures 19 and 20 illustrate the pendulum-impact test. The instrumented test container was placed on a platform and the end/side to be impacted was placed beyond the front end of the platform so that it could impact against a bumper. The platform was pulled back to a vertical drop height of 9 inches and released to swing freely so that the end/side of the container impacted against the bumper. A drop height of 9 inches results in a velocity of 7 feet per second at impact.

Results: Visual inspection of the test container revealed no damage. A maximum of 13.1Gs was obtained during the tests. The results of the tests are acceptable.

Test No. 15: Pressure and vacuum tests were performed on the test container. Pressure and vacuum tests were performed at 1.00 psig. The failure criteria for each test was - 0.025 psig for a 30-minute period (Figure 4).

Results: At the end of the 30-minute pressure/vacuum test period, the results were as follows:

Pneumatic Pressure Test - 0.000 psig.
Vacuum Test ----- 0.022 psig.

The results of the tests are acceptable.

Conclusion: From the results obtained, the container CNU-263/L submitted by Alfredried Peyer AG Switzerland will give adequate protection to the AGM-65E Maverick Missile during shipment/storage. The resultant maximum 16.4Gs was below the limit of 40Gs. The lower and upper flanges and the gasket are a major improvement over the original design of the container. Craftsmanship is considered excellent.

Recommendations: The following are recommendations for use in the assembly/disassembly of the CNU-263/L Maverick Missile containers during the storage of AGM-65E Maverick Missiles:

1. CAUTION, when removing cover assembly, Dwg A-35204-2, S. Peyer LTD., CH, DO NOT place closure flange of cover assembly on floor. Turn cover assembly 180 degrees and place top of cover assembly on floor to prevent damage to flange surface, and also prevent accumulation of debris on the silicone compound (Figure 2).

2. CAUTION, prior to assembly of container, wipe cover and base assembly flanges with lint-free material to remove any contaminants that may have accumulated.

3. CAUTION, examine vulcanized joint of gasket, Dwg A-35210-2, S. Peyer LTD CH, joint shall have smooth surfaces for good sealing properties.

4. CAUTION, apply coating of G.E. silicone dielectric compound MIL-S-8660, GE Part No. G-624, NSN 6850-00-880-7616, prior to assembly of container.

5. CAUTION, torque T-bolts, Dwg 35218-2, S. Peyer LTD. CH, to 45 inch pounds. Container WILL NOT pressure/vacuum seal, if correct torque is not maintained.

TABLE 1

| AIR FORCE PACKAGING EVALUATION AGENCY (Container Test Plan) | | | | | AFPEA PROJECT NUMBER | |
|--|---|---------------------------|------|-----------------------|----------------------|-----------|
| | | | | | 83-P7-132 AMEND 1 | |
| CONTAINER SIZE (L X W X D)(INCHES) | | WEIGHT (LBS) | | CUBE (CU. FT.) | QUANTITY | DATE |
| INTERIOR | EXTERIOR | GROSS | ITEM | | | |
| | 107" X 144" X 38" | 734 | 464 | 54 | 1 | 26 Jul 84 |
| ITEM NAME | | | | MANUFACTURER | | |
| AGM-62B Maverick Missile | | | | Swiss | | |
| CONTAINER NAME | | | | CONTAINER COST | | |
| CMT- 8711 | | | | N/A | | |
| PACK DESCRIPTION | | | | | | |
| Fiberglass construction | | | | | | |
| CONDITIONING | | | | | | |
| As noted in test plan | | | | | | |
| TEST NO. | REF STD SPEC AND TEST METHOD OR PROCEDURE NOS | TEST TITLE AND PARAMETERS | | CONTAINER ORIENTATION | INSTRUMENTATION | |

If use of the actual contents is not practical, a dummy load shall be substituted that simulates the contents in weight, shape, center of gravity, and distribution in the container. The material on dummy load shall be in place in the container for the container and its use in all the test conditions, and shall be otherwise specified herein, and it shall be the bottom container tested with additional one or more required for stacking/trimming configuration, if needed. The missile container(s) shall be assembled, loaded, loaded as for shipment for all tests, except where specific modification is required or specified. The total weight of the dummy load shall be the same as the actual weight of the missile, except where specified. The sequence of tests shall be in accordance with the approved test plan as shown below. Failure criteria shall be in accordance with paragraph 3.2.6 of General Requirements. Failure criteria shall consist of tri-axial acceleration placed in a location corresponding to the item center-of-gravity with axes corresponding to longitudinal, vertical, and transverse directions. When these criteria are to be tested, they shall be banded together as in a shipping configuration. The bands shall pass through the forklift pocket into the bottom container.

COMMENTS

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APPROVED BY

RALPH ZYNDA, Chief, Design Division, AFPEA

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TABLE I

| AIR FORCE PACKAGING EVALUATION AGENCY (Container Test Plan) | | | | AFPEA PROJECT NUMBER | |
|--|---|---|--|--|-----------|
| | | | | 83-P7-132 AMEND 1 | |
| CONTAINER SIZE (L X W X D)(INCHES) | | WEIGHT (LBS) | | CUBE (CU. FT.) | QUANTITY |
| INTERIOR: | EXTERIOR: | GROSS: | ITEM: | | DATE |
| | | | | | 26 Jul 83 |
| ITEM NAME | | | MANUFACTURER | | |
| AGM-65B Maverick Missile | | | | | |
| CONTAINER NAME | | | | CONTAINER COST | |
| CNU-263/E | | | | | |
| PACK DESCRIPTION | | | | | |
| Fiberglass construction | | | | | |
| CONDITIONING | | | | | |
| TEST NO. | REF STD SPEC AND TEST METHOD OR PROCEDURE NO's | TEST TITLE AND PARAMETERS | CONTAINER ORIENTATION | INSTRUMENTATION | |
| 1. | | Visual inspection before start of test. | | | |
| 2. | Fed-Std-101 Method 5009.1 | Leaks in Containers. Relief valve replaced with a pressure tight valve. Pneumatic. Pressure Test - 1.0 psig Vacuum Pressure - 1.0 psig Failure Criteria Test - 0.025 psig in 30 minutes | As required | Pressure Manometer | |
| 3. | Mil-Std-648 Sec. 5.2.2 and Fed-Std-101 Sec. 5019.1 | Vibration (Repetitive Shock) Test. 3 to 5 Hz or 1G whichever is less for not less than 1/2 hr. | | Tri-axial Accelerometer | |
| 4. | Mil-Std-648 Sec. 5.2.2.1 | Vibration (Repetitive Shock) Test with Superimposed Load. May use untested container 1/2 hr. | Superimposed load equal to three like containers high, rigidly attached to exciter | Tri-axial Accelerometer | |
| 5. | Fed-Std-101 Method 5016.1 Mil-Std-648 Sec. 5.7.2 | Superimposed-Load Test (Stackability with dunnage). Load on bottom container shall be limited to three loaded containers for a safety factor of 2. Test for 1 hr. | On a flat rigid floor | Yes | |
| 6. | Fed-Std-101 Method 5011.1 Sec. 6.2 & 6.6 | Mechanical Handling Test. Sec. 6.2 - Forklift Handling Test. Lift container(s) off ground with tines, then carry | One high and one wide then repeat, two high and one wide then repeat, | N/A | |
| COMMENTS | | | | | |
| | | | | | |
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AFPEA PROJECT NUMBER:

DATE _____

MANUFACTURER

CONTAINER NAME

CONTAINER COST

PACK DESCRIPTION

TECHNOLOGICAL CONSTRUCTION CONDITIONING

REF STD SPEC
AND TEST METHOD OR
PROCEDURE NOs

TEST TYPE AND PARAMETERS

CONTAINER
ORIENTATION

INSTRUMENTATION

1. Roll the container 25-30 ft. three times and then
roll it back to the starting position. Roll the container
about 10 ft. in. apart.
2. Roll the test for about 100 feet at a 90° angle
so that the left wheel strikes
the test. Roll 30 ft. from the
starting point at a 75°
angle so that the right wheel
strikes the test. After complet-
ing the 100 feet, lift the
container and inspect. Then
roll to other side and repeat
the test at 90 degree.

[illegible][illegible]

4. Lifted off Deck provisions
Test: Container shall be
loaded to 5 times gross loaded
weight. Lift container and let
hang ten (10) hour. Legs of the
container shall be greater than 30°
to horizontal. Perform
test #3, Pneumatic Leak Test
after test #4.

derivative path Test.
 derivative path test not more
 than 10 POCM resistance from
 path terminating and breaking

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COMMENTS

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TABLE I

| AIR FORCE PACKAGING EVALUATION AGENCY (Container Test Plan) | | | | | AFPEA PROJECT NUMBER | |
|--|--|---|-------|--|-------------------------|-----------|
| | | | | | 83-P7-132 AMEND 1 | |
| CONTAINER SIZE (L X W X D)(INCHES) | | WEIGHT (LBS) | | CUBE (CU. FT.) | QUANTITY | DATE |
| INTERIOR: | EXTERIOR: | GROSS: | ITEM: | | | |
| | | | | | | 26 Jul 83 |
| ITEM NAME | | | | MANUFACTURER | | |
| AGM-65B Maverick Missile | | | | | | |
| CONTAINER NAME | | | | CONTAINER COST | | |
| CNU-263/E | | | | | | |
| PACK DESCRIPTION | | | | | | |
| Fiberglass construction | | | | | | |
| CONDITIONING | | | | | | |
| TEST NO. | REF STD SPEC AND TEST METHOD OR PROCEDURE NO's | TEST TITLE AND PARAMETERS | | CONTAINER ORIENTATION | INSTRUMENTATION | |
| 8. | | point from the missile skin to an external ground. | | | | |
| (CONT'D) | | | | | | |
| 9. | | Cover Handle Pull Test 300 lb. Pull in every direction that service loads are possible. | | | N/A | |
| 10. | Mil-Std-648 Sec 5.6.2 | Pressure Test 1.5 psig | | | Water Manometer | |
| 11. | Mil-Std-310 Method 506.1, Procedure I | Rain with Wind Source. Total test duration of not less than 2 hours. | | As required | N/A | |
| 12. | Fed-Std-101 Method 5005.1 | Cornerwise-Drop (Rotational) Test from 20" height. | | One drop on each corner (total 4 drops) | Tri-axial Accelerometer | |
| 13. | Fed-Std-101 Method 5008.1 | Edgewise-Drop (Rotational) Test from 20" height. | | One drop on each edge (total 4 drops) | Tri-axial Accelerometer | |
| 14. | Fed-Std-101 Method 5012 | Pendulum-Impact Test (7 ft/sec) from 9" height. | | One impact to each side & each end (total 4 impacts) | N/A | |
| 15. | | Perform test #2 Pneumatic Leak Test after test #14. | | | | |
| COMMENTS: | | | | | | |
| PREPARED BY: EDWARD J. KOWALSKI, Mech Engr, AFPEA | | | | APPROVED BY: RALPH ZYNDA, Chief, Design Division, AFPEA | | |

TABLE 11

Visual Inspection
 CNU-263/E Container - AGM-65B Maverick Missile

| Requirement | Accept | Reject | Remarks |
|--------------------------------|--------|--------|--|
| Weight 264 pounds | X | | |
| Base Section/Cover Section | X | | |
| Forklift Pockets | X | | Gel-coat slight damage, side of pocket |
| Stacking Interface | X | | |
| Hoisting/Tie-Down Provisions | X | | |
| Access Point | X | | |
| Humidity Indicator | X | | |
| Pressure Equalizing Valve | X | | |
| Electrical Grounding Connector | X | | |
| Records Receptacle | X | | |
| Security Seal | | | No security seal |
| Weldments | X | | |
| Identification/Markings | X | | |
| Human Performance | X | | |
| Closure Hardware | X | | |
| Container Seal | X | | |
| Cushioning | X | | |
| Strapping | X | | |
| Workmanship | X | | Excellent |



Figure 1. CNU-263/E Maverick
Missile Container,
Serial No. CH-001
fabricated by
S. Peyer LTD. CH.

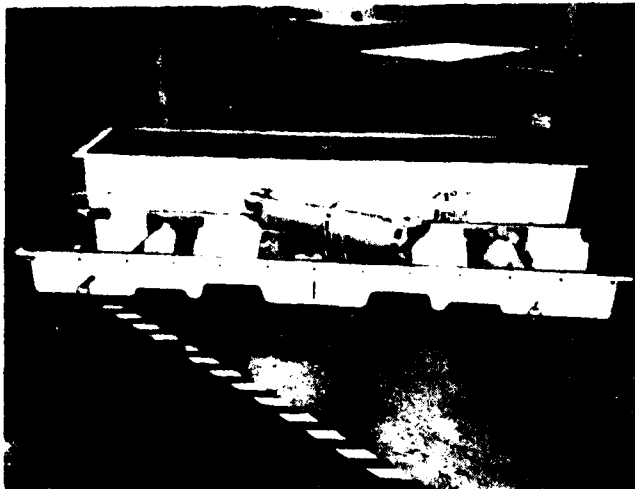


Figure 2. Figure illustrates
packaging of strapping
and restraint assem-
blies.

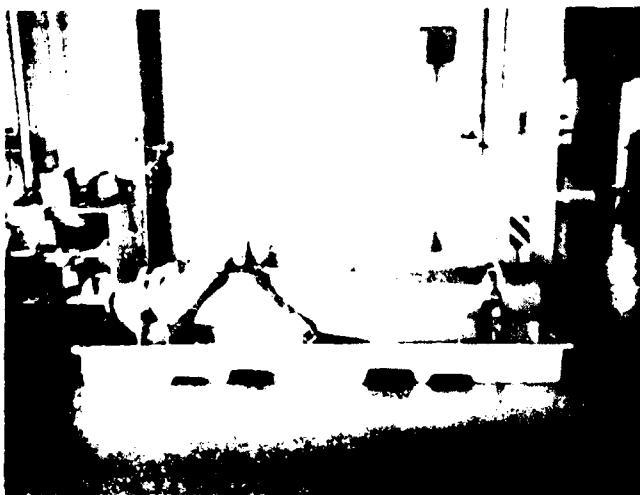


Figure 3. AGM-65E inert
Maverick Missile
assembled for
container testing.



Figure 4. Pressure/vacuum
container leak test.

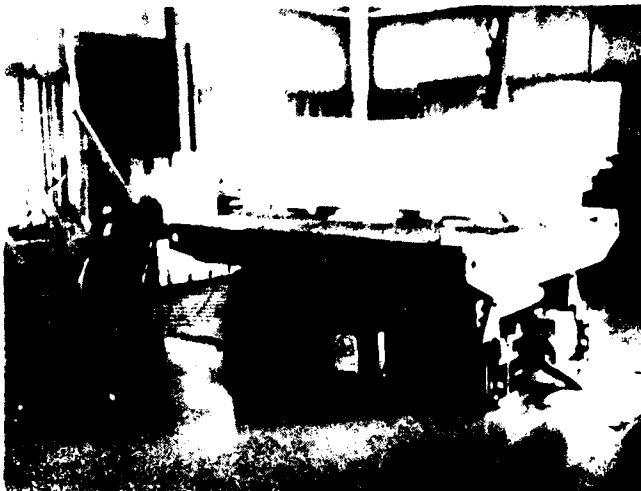


Figure 5. Vibration (repetitive
shock) test.

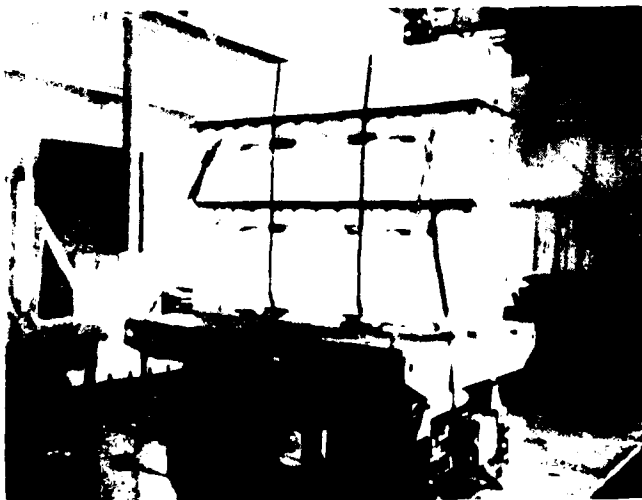


Figure 6. Vibration (repetitive
shock) test with
superimposed load.

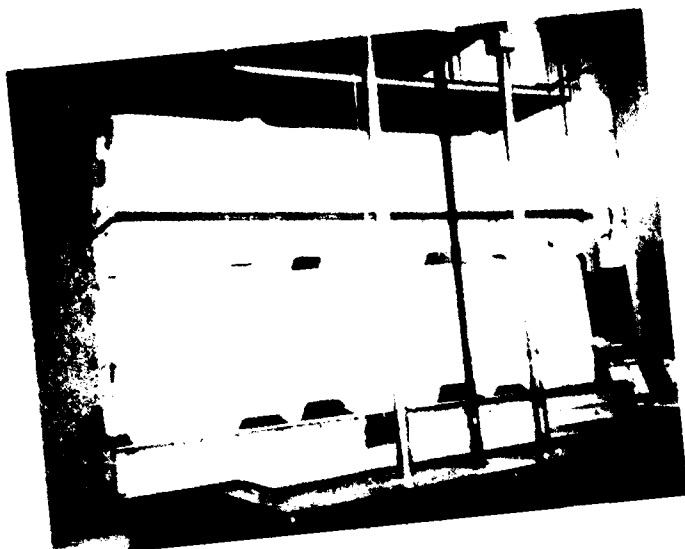


Figure 7. Superimposed-Load test.

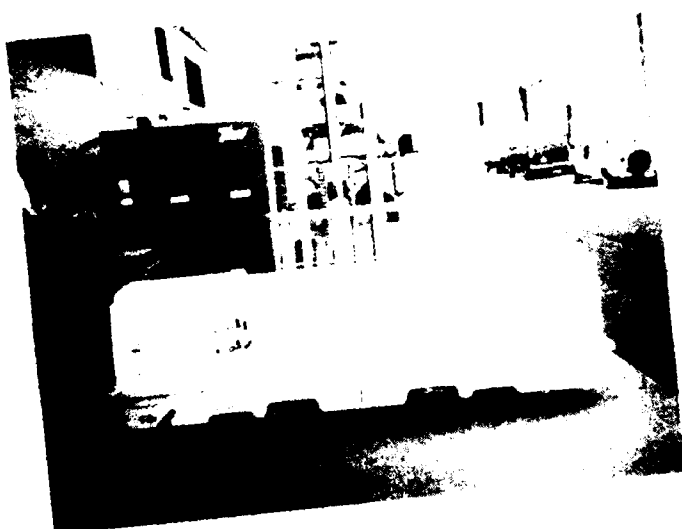


Figure 8. Forklift handling test.

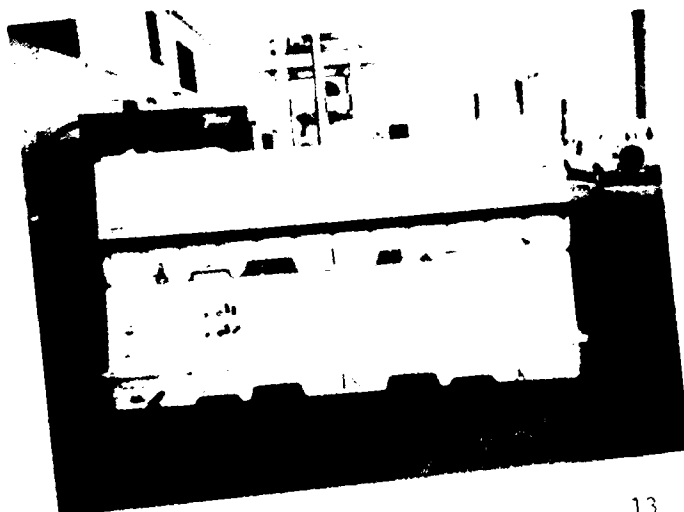


Figure 9. Forklift handling test.

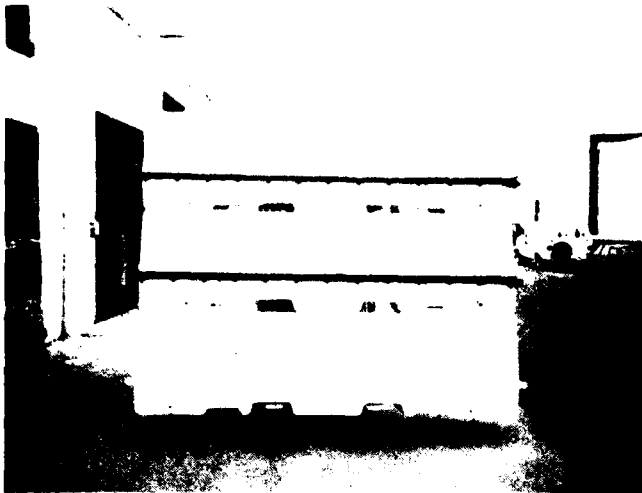


Figure 10. Forklift handling test.



Figure 11. Towing ring test from end position.



Figure 12. Towing ring test from side position.

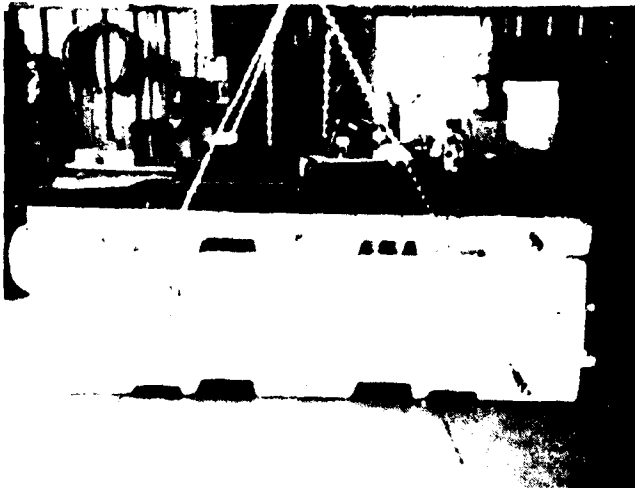


Figure 13. Hoisting/tie-down provisions test.

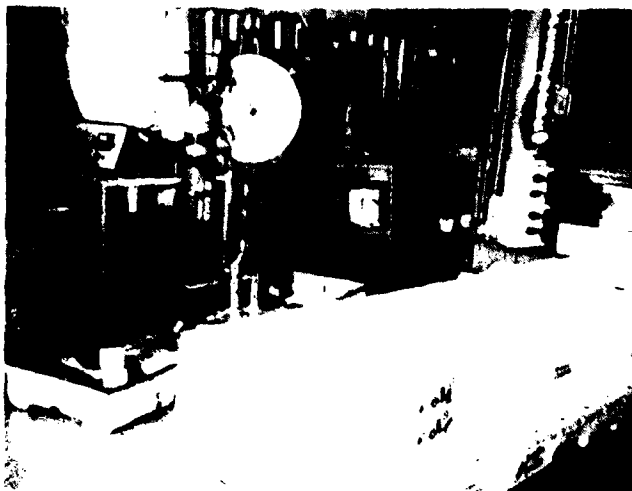


Figure 14. Cover handle pull test.

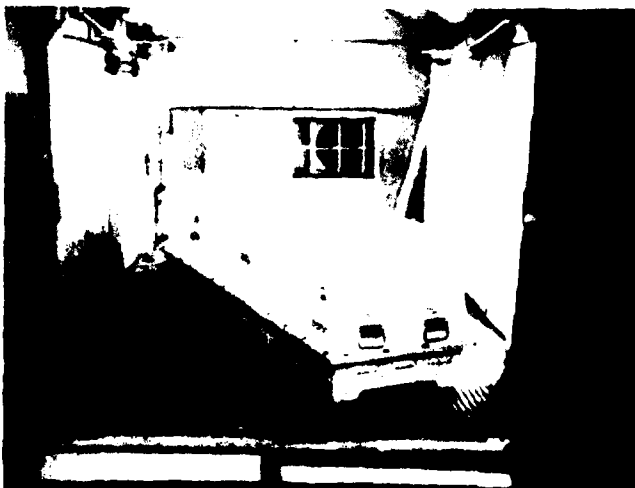


Figure 15. Rain/wind test.



Figure 16. Cornerwise-drop
(rotational) test,
container end.



Figure 17. Edgewise-drop
(rotational) test,
container end.



Figure 18. Edgewise-drop
(rotational) test,
container side.

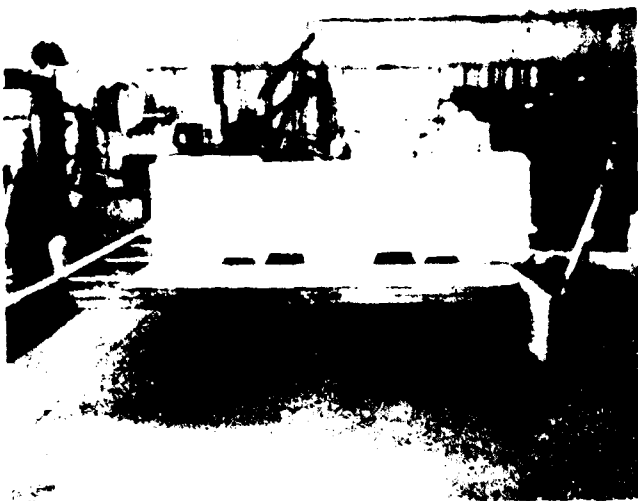


Figure 19. Pendulum-impact test, container end.

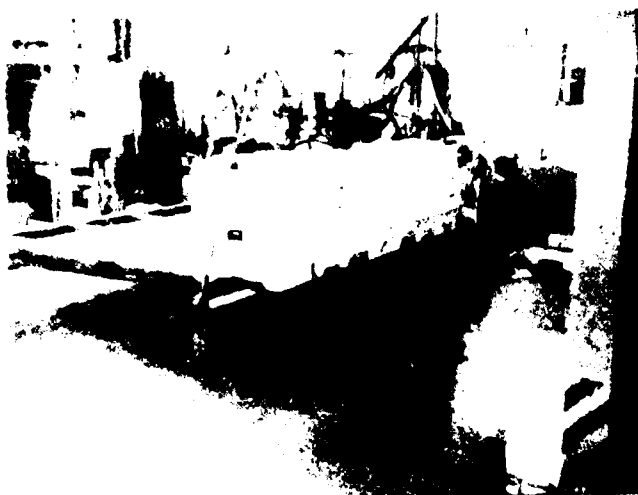


Figure 20. Pendulum-impact test, container side.

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